Bibliography of Data Sources for Use in Developing a Model of Diesel Fuel Emission Effects

U.S. Environmental Protection Agency
Office of Transportation and Air Quality
January 25, 2001

The enclosed list of data sources resulted from a literature search and review of in-house EPA archives in preparation for development of a statistical regression model. The model is intended to permit users to predict how emissions from diesel-powered, heavy-duty vehicles are affected by changes in diesel fuel properties. The final model, intended to be publicly released by May of 2001, will ultimately be posted on the Web site for this project at http://www.epa.gov/otaq/models/analysis.htm.

For questions related to this bibliography, contact David Korotney at korotney.david@epa.gov

Data sources which meet all basic criteria and which we intend to use in developing the model

1. Mitchell, K., "Effects of Fuel Properties and Source on Emissions from Five Different Heavy Duty Diesel Engines," SAE 2000-01-2890

2. Cheng, A. S., R. W. Dibble, "Emissions Performance of Oxygenate-in-Diesel Blends and Fischer-Tropsch Diesel in a Compression Ignition Engine," SAE 1999-01-3606.

3. Vertin, K. D., J. M. Ohi, D. W. Naegeli, K. H. Childress, G. P. Hagen, C. I. McCarthy, A. S. Cheng, R. W. Dibble, "Methylal and Methylal-Diesel Blended Fuels for Use in Compression-Ignition Engines," SAE 1999-01-1508.

4. Schwab, Scott D., G. H. Guinther, T. J. Henly, K. T. Miller, "The Effects of 2-Ethylhexyl Nitrate and Di-Tertiary-Butyl Peroxide on the Exhaust Emissions from a Heavy-Duty Diesel Engine," SAE 1999-01-1478.

5. Clark, Nigel N., C. M. Atkinson, G. J. Thompson, R. D. Nine, "Transient Emissions Comparisons of Alternative Compression Ignition Fuels," SAE1999-01-1117.

6. Starr, Michael E., "Influence on Transient Emissions at Various Injection Timings, Using Cetane Improvers, Bio-Diesel, and Low Aromatic Fuels," SAE 972904.

7. Becker, R. F., P. Ndiomu, D. H. Hoskin, " Reduction in Particulate and Black Smoke in Diesel Exhaust Emissions," SAE 972903.

8. Schabert, Paul W., Ian S. Myburgh, Jacobus J. Botha, Piet N. Roets, Carl L. Viljeon, Luis P. Dancuart, Michael E. Starr, "Diesel Exhaust Emissions Using Sasol Slurry Phase Distillate Process Fuels," SAE 972898.

9. Lange, W.W., J.A. Cooke, P. Gadd, H.J. Zurner, H. Schlogl, and K. Richter., "Influence of fuel Properties on Exhaust Emissions from Advanced heavy-Duty Engines considering the Effect of Natural and Additive Enhanced Cetane Number," SAE 972894.

10. Stradling, Richard, Paul Gadd, Meinrad Signer, Claudio Operti, "The Influence of fuel Properties and Injection Timing on the Exhaust Emissions and fuel Consumption of an Iveco Heavy-Duty Diesel Engine," SAE 971635.

11. Tamanouchi, Mitsuo, Jiroki Morihisa, Shigehisa yamada, Jihei Lida, Takanobu Sasaki, and Harufusa Sue, "Effects of Fuel Properties on Exhaust Emissions for Diesel Engines With and Without Oxidation Catalyst and High Pressure Injection," SAE 970758.

12. Daniels, Teresa L., Robert L. McCormick, Michael S. Graboski, Philip N. Carlson, Venkatesh Rao, and Gary W. Rich, "The Effect of diesel Sulfur Content and Oxidation Catalysts on Transient Emissions at High Altitude from a 1995 Detroit diesel Series 50 Urban Bus Engine," SAE 961974.

13. Geiman, Richard A., Patrick B. Cullen, Peter R. Chant, Philip N. Carlson and Venkatesh Rao, "Emission Effects of Shell LOW NOX Fuel on a 1990 Model Year Heavy Heavy-Duty Diesel Engine," SAE 961973.

14. Graboski, M.S., J.D. Ross, R.L. McCormick, "Transient Emissions from No. 2 Diesel and Biodiesel Blends in a DDC Series 60 Engine," SAE 961166

15. Mitchell, K., D.E. Steere, J.A. Taylor, B. Manicom, J.E. fisher, E.J. Sienicki, C. Chiu, P. Williams, "Impact of Diesel Fuel Aromatics on Particulate, PAH and Nitro-PAH Emissions," SAE 942053.

16. Nandi, Manish K., David C. Jacobs, Frank J. Liotta, Jr., H.S. Kesling, Jr., "The Performance of a Peroxide-Based Cetane Improvement Additive in Different Diesel Fuels," SAE 942019.

17. Rosenthal, M. Lori, Tracy Bendinsky, "The Effects of Fuel Properties and Chemistry on the Emissions and Heat Release of Low-Emission Heavy Duty Diesel Engines," SAE 932800.

18. Liotta, Jr., Frank J., "A Peroxide Based Cetane improvement Additive with Favorable Fuel Blending Properties," SAE 932767.

19. Liotta, Jr., Frank J., Daniel M. Montaivo, "The Effect of Oxygenated Fuels on Emissions from a Modern Heavy-Duty Diesel Engine," SAE 932734.

20. Gonzalez D., Manuel A., Guillermo B. Rodriguez, Roberto Galiasso, Edilberto Rodriguez, "A Low Emission Diesel Fuel: Hydrocracking Production, C haracterization and Engine Evaluations," SAE 932731.

21. Lange, W.W., A. Schafer, A. Le'Jeune, D. Naber, A.A. Reglitzky, M. Gairing, "The influence of Fuel Properties on Exhaust Emissions from Advanced Mercedes Benz Diesel Engines," SAE 932685.

22. McCarthy, Christopher I., Warren J. Slodowske, Edward J. Sienicki, Richard E. Jass, "Diesel Fuel Property Effects on Exhaust Emissions from a Heavy Duty Diesel Engine that Meets 1994 Emissions Requirements, SAE 922267.

23. Lange, W.W., "The Effect of Fuel Properties on Particulates Emissions in Heavy-Duty Truck Engines Under Transient operating Conditions," SAE 912425.

24. Ullman, Terry L., David M. Human, "Fuel and Maladjustment Effects on Emissions from a Diesel Bus Engine," SAE 910735.

25. Cunningham, Lawrence J., Timothy J. Henly, Alexander M. Kulinowski, "The Effects of Diesel Ignition Improvers in Low-Sulfur Fuels on Heavy-Duty Diesel Emissions," SAE 902173.

26. Sienocki, E., R.E. Jass, W.J. Slowdowske, C.I. McCarthy, A.L. Krodel, "Diesel Fuel Aromatic and Cetane Number Effects on Combustion and Emissions from a Prototype 1991 Diesel Engine," SAE 902712

27. Knuth, Hans Walter, Hellmut Garthe, "Future Diesel Fuel Compositions - Their Influence on Particulates." SAE 881173.

28. Barry, E.G., L.J. McCabe, D.H. Gerke, J.M. Perez, "Heavy-Duty Diesel Engine/Fuels Combustion Performance and Emissions - A Cooperative Research Program," SAE 852078.

29. Ullman, Terry L.,"Investigation of the Effects of Fuel Composition and Injection and Combustion System Type on Heavy-Duty Diesel Exhaust Emissions," CRC Contract CAPE 32-80. Project VE-1.

30. Ullman, Terry L., R. L. Mason, D. A. Montalvo, "Study Of Fuel Cetane Number And Aromatic Content Effects on Regulated Emissions From A Heavy-Duty Diesel Engine," CRC Contract NO. VE-1. Project VE-1.

31. Spreen, Kent B., T. L. Ullman, R. L. Mason, "Effects of Fuel Oxygenates, Cetane Number, and Aromatic Content on Emissions From 1994 and 1998 Prototype Heavy-Duty Diesel Engines," CRC Contract No. VE-10. Project VE-10.

32. Matheaus, Andrew C., T. W. Ryan III, R. Mason, G. Neely, R. Sobotowski, "Gaseous Emissions From A Caterpillar 3176 (With EGR) Using A Matrix of Diesel Fuels (Phase 2)," Final Report under EPA Contract Number 68-C-98-169, September 1999.

33. As-yet unpublished results of the follow-on Phase 3 testing associated with source #31 above. Contact: Glenn Passavant, 734-214-4408.

Data sources which could be used, but the data is not readily available

1. Uchida, M., Y. Akasaka, "A Comparison of Emissions from Clean Diesel Fuels," SAE 1999-01-1121

2. Tamanouchi, M., H. Morihisa, H. Araki, S. Yamada, "Effects of Fuel Properties and Oxidation Catalyst on Exhaust Emissions for Heavy-Duty Diesel Engines and Diesel Passanger Cars," SAE 980530

3. Akasaka, Y., T. Suzuki, Y. Sakurai, "Exhaust Emissions of a DI Diesel Engine Fueled with Blends of Biodiesel and Low Sulfur Diesel Fuel," SAE 972998

4. Nylund, N., P. Aakko, S. Mikkonen, A. Niemi, "Effects of Physical and Chemical Properties of Diesel Fuel on NOx Emissions of Heavy-Duty Diesel Engines," SAE 972997

5. Signer, M., P. Heinze, R. Mercogliano, H.J. Stein, "European Programme on Emissions, Fuels and Engine Technologies (EPEFE) - Heavy-Duty Diesel Study," SAE 961074

6. Kobayashi, S., T. Nakajima, M. Hori, "Effect of Fuel Properties on Diesel Exhaust Emissions," SAE 945121

7. Den Ouden, C.J.J., R.H. Clark, L.T. Crowley, R.J. Stradling, W.W. Lange, C. Maillard, "Fuel Quality Effects on Particulate Matter Emissions from Light- and Heavy-Duty Diesel Engines," SAE 942022

8. Crowley, L.T., R.J. Stradling, J. Doyon, "The Influence of Composition and Properties of Diesel Fuel on Particulate Emissions from Heavy-Duty Engines," SAE 932732

9. Asaumi, Y., M. Shintani, Y. Watanabe, "Effects of Fuel Properties on Diesel Engine Exhaust Emission Characteristics," SAE 922214

10. Likos, B., T.J. Callahan, C.A. Moses, "Performance and Emissions of Ethanol and Ethanol-Diesel Blends in Direct-Injected and Pre-Chamber Diesel Engines," SAE 821039

11. Broering, L.C., L.W. Holtman, "Effect of Diesel Fuel Properties on Emissions and Performance," SAE 740692

Data sources which have been discarded because the data was collected on a single-cylinder research engine

1. Neill, W.S., W.L. Chippior, O.L. Gulder, J. Cooley, E.K. Richardson, K. Mitchell, C. Fairbridge, "Influence of Fuel Aromatics Type on the Particulate Matter and NOx Emissions of a Heavy-Duty Diesel Engine," SAE 2000-01-1856

2. Kidogucki, Y., C. Yang, K. Miwa, "Effects of Fuel Properties on Combustion and Emission Characteristics of a Direct-Injection Diesel Engine," SAE 2000-01-1851

3. Hara, H., Y. Itoh, N. A. Henien, W. Bryzik, " Effect of Cetane Number With and Without Additive on Cold Startability and White Smoke Emissions in a Diesel Engine," SAE 1999-01-1476.

4. Kouremenos, D.A., D. T. Hountalas, A. D. Kouremenos, “Experimental Investigation of the Effects of Fuel Composition on the Formation of Pollutants in Direct Injection Diesel Engines,” SAE 1999-01-0189.

5. Nakakita, K, S. Takasu, H. Ban, T. Ogawa, H. Naruse, Y. Tsukasaki, L. I. Yeh. “Effect of Hydrocarbon Molecular Structure on Diesel Exhaust Emissions,” SAE 982494.

6. Li, X., W. L. Chippior, O. L. Gulder, "Effects of Fuel Properties on Exhaust Emissions of a Single Cylinder DI Diesel Engine," SAE 962116.

7. Akasaka, Y., Y. Sakurai, "Effects of Oxygenated Fuel and Cetane Improver on Exhaust Emission from Heavy-Duty DI Diesel Engine," SAE 942023

8. Kajitani, S., H. Usisaki, E. Clausen, S. Campbell, K. T. Rhee, "MTBE for Improved Diesel Combustion and Emissions?," SAE 941688

9. Ryan, T.W., III, J. Erwin, "Diesel Fuel Composition Effects on Ignition and Emissions," SAE 932735.

10. Belardini, P., C. Bertoli, F. E. Corcione, G. Police, " Effect of Fuel Quality on the Performance of High-Speed Direct Injection Diesel Engines," SAE 852077.

11. Erwin, J., T.W. Ryan, III, D. S. Moulton, "Diesel Fuel Component Contribution to Engine Emissions and Performance," National Renewable Energy Laboratory, TP-425-6354, November 1994

12. Ladommatos, N., M. Parsi, A. Knowles, "The Effect of Fuel Cetane Improver on Diesel Pollutant Emissions," *Fuel* Vo. 75 No. 1, pp. 8-14, 1996

13. Karonis, D., E. Lois, S. Stournas, F. Zannikos, "Correlations of Exhaust Emissions from a Diesel Engine with Diesel Fuel Properties," *Energy & Fuels* 1998, *12*, 230-238

Data sources which have been discarded because the data was collected on light-duty vehicles and/or engines

1. Nic Mann, Frode Kvinge, Geoff Wilson, “Diesel Fuel Effects on Emissions: Towards a Better Understanding,” SAE 982486

2. Xiaobin Li, Wallace L. Chippior, and Omer L. Gulder, “Effects of Cetane Enhancing Additives and Ignition Quality on Diesel Engine Emissions,” SAE 972968.

3. Kevin Schmidt and Jon Van Gerpen, “The Effect of Biodiesel Fuel Composition on Diesel Combustion and Emissions,” SAE 961086

4. R. H. Hammerie, D.A. Ketcher, and R. W. Horrocks, G. Lepperhoff, G. Huthwohl, and B. Luers, “Emissions from Current Diesel Vehicles,” SAE 942043.

5. B. P. Pundir, S. K. Singal and A. K. Gondal, “Diesel Fuel Quality: Engine Performance and Emissions,” SAE 942020.

6. Bertoli, C., N. Del Giacomo, B. Iorio, M.V. Prati, "The Influence of Fuel Composition on Particulate Emissions of DI Diesel Engines," SAE 932733

7. Ari Juva, Paul Zelenka and Peter Tritthart, “Influences of Diesel Fuel Properties and Ambient Temperature on Engine Operation and Exhaust Emissions.” SAE 890012

8. R. M. Olree, D. L. Lenane, “Diesel Combustion Cetane Number Effects,” SAE 840108.

Data sources which were excluded for other reasons

1. David Y.Z. Chang and Jon H. Van Gerpen, "Fuel Properties and Engine Performance for Biodiesel Prepared from Modified Feedstocks," SAE 971684

   Reason: Only one mode was used in testing

2. Tadao Ogawa, Klyomi Nakakita, and Minoru Yamamoto, Masanori Okada and Yoshio Fujimoto, "Fuel Effects on Particulate Emissions from D.I. Engine - Relationship among Diesel Fuel, Exhaust Gas and Particulates," SAE 971605

   Reason: Injection timing was changed for each mode

3. Shigeyuki Tanaka, Masataka Morinaga, Haruhisa Yoshida, Haruo Takizawa, Kazuyoshi Sanse, and Hiromichi Ikebe, "Effects of Fuel Properties on Exhaust Emissions from DI Diessel Engines," SAE 962114.

   Reason: Pure chemicals were used in developing test fuels

4. Thomas W. Ryan III, Jimell Erwin, Robert L. Mason, and David S. Moulton, "Relationships Between Fuel Properties and Composition and Diesel Engine Combustion Performance and Emissions," SAE 941018.

   Reason: Repeats SAE 932735

5. Mitsuo Tamanouchi and Yukio Akasaka, "Effects of Fuel Composition on Exhaust Gas Emissions from DI and DI Impingement Diffusion Combustion Diesel Engines," SAE 941016.

   Reason: Pure chemicals were used in developing test fuels

6. Cynthia A. Chaffin and Terry L. Ullman, "Effects of Increased Altitude on Heavy-Duty Diesel Engine Emissions," SAE 940669.

   Reason: Study of altitude, not fuel effects

7. Bower, G., R. Donahue, D. Shamis, D. Foster, "Emission Tests of Diesel Fuel with NOx Reduction Additives," SAE 932736

   Reason: Single-cylinder engine tested on only two modes

8. Shigeru Tosaka, Yasuhiro Fujiwara, Tadashi Murayama, "The Effect of Fuel Properties on Diesel Engine Exhaust Particulate Formation," SAE 890421.

   Reason: Thermal cracking study using a cracking bong